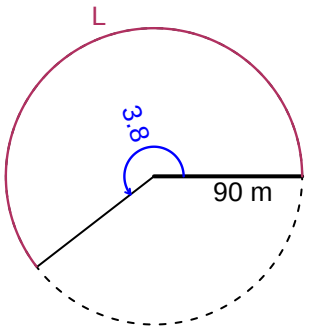
Name: Date:

Trig Final (SLTN v688)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 90 meters. The angle measure is 3.8 radians. How long is the arc in meters?

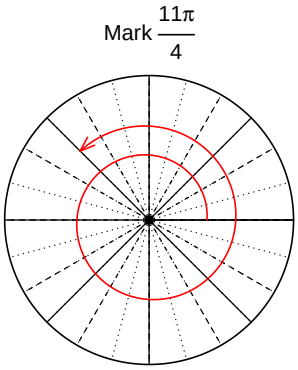


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

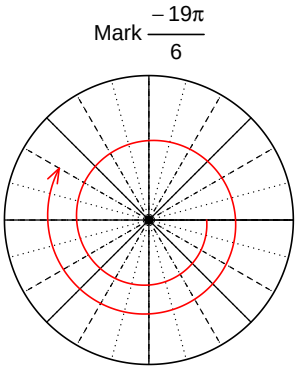
$L = 342$ meters.

Question 2

Consider angles $\frac{11\pi}{4}$ and $\frac{-19\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{11\pi}{4}\right)$ and $\sin\left(\frac{-19\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(11\pi/4)$



Find $\sin(-19\pi/6)$

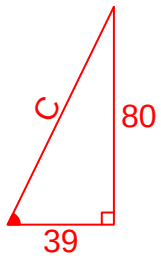
$\cos(11\pi/4) = \frac{-\sqrt{2}}{2}$

$\sin(-19\pi/6) = \frac{1}{2}$

Question 3

If $\tan(\theta) = \frac{-80}{39}$, and θ is in quadrant IV, determine an exact value for $\cos(\theta)$.

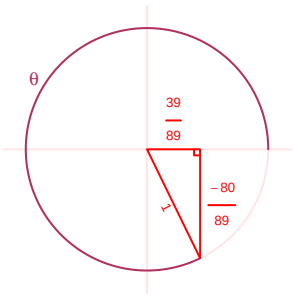
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$39^2 + 80^2 = C^2$$
$$C = \sqrt{39^2 + 80^2}$$
$$C = 89$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\cos(\theta) = \frac{39}{89}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -5.06$ meters, a frequency of 3.04 Hz, and an amplitude of 8.6 meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 8.6\sin(2\pi 3.04t) - 5.06$$

or

$$y = 8.6\sin(6.08\pi t) - 5.06$$

or

$$y = 8.6\sin(19.1t) - 5.06$$